UNIVERSITY OF VIRGINIA
DIVISION OF STATISTICS
DEPARTMENT OF MATHEMATICS
MATHEMATICS-ASTRONOMY BUILDING
CHARLOTTESVILLE, VIRGINIA 22903-3199

Final Report - ONR contract No. N00014-87-K-0367

- January 1, 1987 - December 31, 1988

- A Pattern-Theoretic Formulation of Shape in R^3

- Daniel MacRae Keenan

The goal of this grant was the formulation of a theory of shape in the plane with the theory being applied to problems in image processing. This development was completed in the case of object recognition/image restoration where the planar objects are characterized by their one-dimensional boundaries, such as in many biological shapes. For example, given a two-dimensional "noisy" image from some technology, such as a visible-light camera, the methods allow one to build in a priori information concerning the object (or objects) in the image, resulting in an a posteriori probability measure on the possible objects in the scene. This approach is designed to capture the structure of those objects which have a large number of degrees of freedom in shape while all still maintain a certain common form; this invariance is not captured by the traditional geometries.

Publications

Books: (with Y. Chow and U. Grenander) *Hands: A Pattern-Theoretic Study of Biological Shapes* - Springer Verlag (publication date: August, 1990).

Papers: (with U. Grenander) A computer experiment in pattern theory: Stochastic Models, Vol. 5, No. 4, 531-553 (1989).

(with P. Hall) Bootstrap methods for constructing confidence regions for hands. Stochastic Models, Vol. 5, No. 4, 555-562 (1989).

(with U. Grenander) Toward Automated Image Understanding. J. Applied Statistics (1989).

The above publications have been sent to the program director:

Dr. Julia Abrahams
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They can be obtained either from her or by contacting the P.I. Any questions concerning possible applications of the methods are encouraged.

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STATEMENT "A" per Dr. J. Abrahams
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